

In re Patent Application of:
VIGIL ET AL.
Serial No. 09/840,481
Filing Date: April 23, 2001

REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application. Applicants would also like to thank the Examiner for the courtesies extended during the telephone interview on December 13, 2005.

During the interview, the Examiner stressed that the training sequence as recited in the claims needs to be more clearly defined over the training sequence disclosed in the Lyons et al. patent. The Examiner indicated that amending independent Claim 25, for example, to include the subject matter from dependent Claims 28-30, which is directed to the training sequence, would more clearly define over the training sequence disclosed in the Lyons et al. patent. Consequently, independent Claims 25, 35 and 42 have been amended to include the subject matter in their respective dependent claims directed to the training sequence. These dependent claims have been cancelled.

The claim amendments and arguments supporting patentability of the claims are presented in detail below.

I. The Claimed Invention

The present invention, as recited in amended independent Claim 25, for example, is directed to a method for mitigating multipath in a digital television signal (DTV) that is ATSC DTV compliant. The method comprises estimating modulation characteristics of DTV data to be transmitted, and generating a training sequence that is ATSC DTV compliant. The training sequence is based upon a priori knowledge of the DTV data including the generated modulation characteristics.

The method further comprises multiplexing the

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training sequence with the DTV data to generate a multiplexed DTV data stream with the training sequence embedded therein, and modulating the multiplexed DTV data stream for transmission. A transmitted DTV signal is received, and correlation peaks in the received DTV signal are detected based upon the multiplexed training sequence embedded therein. The detected correlation peaks are used to mitigate multipath in the received DTV signal.

The present invention may advantageously mitigate multipath based upon the training sequence that is ATSC DTV compliant, and which is then modulated with the DTV data for transmission. With the training sequence embedded in the transmitted DTV signal, a receiver detects correlation peaks based upon the training sequence in the received DTV signal. The detected correlation peaks are used to mitigate multipath in the received DTV signal. Moreover, the training sequence is based upon a priori knowledge of the DTV data including the generated modulation characteristics.

Independent method Claim 31 is similar to amended independent method Claim 25 except this claim is directed to the transmitter functions. Independent Claim 31 was not amended since this claim already recited the step of estimating modulation characteristics of DTV data to be transmitted so that generation of a training sequence is based upon the estimated modulation characteristics of the DTV data.

Independent device Claim 35 has been amended similar to independent method Claim 25, and is directed to digital television (DTV) system comprising a transmitting system and a receiving system. Independent device Claim 42 has been

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VIGIL, ET AL.
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amended similar to independent Claim 25 and is directed to a digital television (DTV).

II. The Claims Are Patentable

The Examiner rejected independent Claims 25, 31, 35 and 42 over the Grabb et al. patent in view of the Lyons et al. patent.

In FIG. 1 of the Grabb et al. patent, a wideband overlay sequence generator 103 provides an overlay signal (i.e., reference data) that is added to the DTV signal to be transmitted. The overlay signal allows a receiver to estimate the transmission channel and allows mitigation of changing multipath conditions. In particular, periodic correlation peaks are detected in the received overlay signal received by the receiver, and the timing and magnitudes of the peaks in the received overlay signal are used to mitigate multipath in the received signal.

As correctly noted by the Examiner, the overlay signal in Grabb et al. is not a training sequence that is ATSC DTV compliant. In addition, the overlay signal is added after the DTV data has been modulated. Consequently, the Examiner correctly notes that Grabb et al. also fails to disclose that the training sequence is multiplexed with the DTV data to generate a multiplexed DTV data stream with the training sequence embedded therein, and that the multiplexed DTV data stream is modulated for transmission.

The Examiner cited the Lyons et al. patent in an attempt to address the noted deficiencies of Grabb et al. In particular, the Examiner states that Lyons et al. discloses that the ATSC broadcast system includes three general

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subsystems: source coding and compression, service multiplex and transport, and transmission. The first subsystem - source coding and compression - deals with bit reduction for the video, audio and ancillary digital data streams. The second subsystem - service multiplex and transport - deals with dividing each digital stream into "packets" and multiplexing the video stream packets, and the audio stream packets and ancillary digital data stream packets into a single transport stream. The third subsystem - transmission - deals with channel coding and modulation.

The Examiner has taken the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the coder and the modulator as taught by Lyons et al. into Grabb et al. to provide reliable, efficient and affordable digital transmission systems. The Applicants respectfully submit that even if the references were combined as suggested by the Examiner, the claimed invention is still not produced.

In the Lyons et al. patent, the Examiner makes reference to column 1, lines 34-48, which breaks down an ATSC broadcast system into 3 general subsystems: 1) source coding and compression, 2) service multiplex and transport, and 3) transmission. As further disclosed, the source coding and compression subsystem deals with bit rate reduction for the video, audio and ancillary digital data streams.

In the final Official Action, the Examiner has taken the position that the source coding and compression subsystem generates a training sequence that is ATSC DTV compliant, and consequently, the service multiplex and transport subsystem generates a multiplexed DTV data stream with the training

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Serial No. 09/840,481
Filing Date: April 23, 2001

sequence embedded therein.

The 3 general subsystems for an ATSC broadcast system are also illustrated in FIG. 12 in the Applicants' specification. The 1) source coding and compression subsystem is represented by reference numerals 105, 110 and 115; the 2) service multiplex and transport subsystem is represented by reference numeral 125; and the 3) transmission subsystem is represented by reference numerals 135-185. The video, audio and ancillary digital data streams 105, 110 and 115 are not a training sequence to mitigate multipath in a received DTV signal. Instead, these data streams are simply the video, audio and ancillary data portions of the DTV data to be transmitted.

In the claimed invention, the training sequence is represented by reference numeral 1110. The training sequence 1110 is multiplexed along with the DTV data by multiplexer 125 to generate a multiplexed DTV data stream with the training sequence embedded therein. This is prior to modulation by modulator 180.

As helpfully suggested by the Examiner, independent Claim 25 has been amended to more clearly define how the training sequence is generated. In the claimed invention, the modulation characteristics of DTV data to be transmitted is estimated, then the training sequence that is ATSC DTV compliant is generated, wherein the training sequence is based upon a priori knowledge of the DTV data including the generated modulation characteristics. In the Lyons et al. patent, no reference is made as to how the training sequence is generated. Accordingly, it is submitted that amended

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Filing Date: April 23, 2001

independent Claim 25 is patentable over Grabb et al. in view of Lyons et al.

Independent Claim 31 and amended independent 35 and 42 are similar to amended independent Claim 25. Accordingly, it is also submitted that independent Claims 31, 35 and 42 are patentable over Grabb et al. in view of Lyons et al. In view of the patentability of independent Claims 25, 31, 35 and 42, it is submitted that their dependent claims, which recite yet further distinguishing features of the invention, are also patentable. These dependent claims require no further discussion herein.

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Serial No. 09/840,481
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CONCLUSION

In view of the amendments to the claims and the arguments provided herein, it is submitted that all the claims are patentable. Accordingly, a Notice of Allowance is requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number 571-273-8300 to the Commissioner for Patents on this 6 day of January, 2006.

Karen Dhandekar